1 513 055

PATENT SPECIFICATION

(11) 1 513 055

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(54) IMPROVEMENTS IN OR RELATING TO DISPOSABLE DIAPERS

(71) I, JOHN THOMAS McCULLINS of the Department of Industrial and Forensic Science (Department of Commerce), 180, Newtonbreda Road, Belfast BT8 4QR, a British subject, do hereby declare the invention for which I pray that a patent may be granted to me,. and the method by which it is to be performed to be particularly described in and by the following statement:—

This invention relates to disposable diapers.

A variety of disposable diapers is commercially available comprising a moisture impervious backing sheet, a pad of absorbent material on the backing sheet and a top sheet overlying the pad of absorbent material, edge portions of which are secured to the backing sheet. Such diapers may be supplied in a folded condition with a box pleated configuration obtained by folding about longitudinally extending fold lines. Typical of such diapers is that described in British Patent Specification No. 1,011,888.

The box pleated configuration is maintained by spots of adhesive applied to the top sheet within the pleat, these spots of adhesive being positioned approximately midway between the ends of the diaper. For use the ends of the diaper are spread out somewhat and the infant is placed with its buttocks on the diaper so that one end of the diaper lies at about its waist level and the other end is drawn up between its legs. Opposite ends of the diaper are brought together on each side and secured by self-adhesive tabs provided for the purpose. These may be secured by one end to the backing sheet with a free end whose adherent surface is protected by a tab of release paper. The box pleated configuration is maintained in the crotch region by means of the spots of adhesive and provides channels for urine and/or semi-liquid excreta.

After use the top sheet can be peeled away from the backing sheet and the top sheet and pad of absorbent material flushed away down a toilet, the backing sheet being disposed of in a waste bin.

Such disposable diapers are very convenient to use particularly when it is desired to travel with a young baby or to take a young baby on holiday. However their use is not without disadvantages. More particularly, although the pad of absorbent material may have a considerable capacity for liquid absorption, leakage may occur around the edges of the diaper where this contacts the legs, leading to undesirable wetting and/or soiling of the child's outer garments. Such leakage may occur in particular when the infant is restless and turning.

The present invention accordingly seeks to provide an improved disposable diaper in which the above-mentioned disadvantage is substantially obviated and the danger of leakage minimised.

According to the present invention there is provided a disposable diaper comprising a moisture impervious backing sheet of length greater than its width, a mass of adsorbent material on said backing sheet, a porous top sheet of length greater than its width overlying said mass, edge portions of said top sheet being secured to said backing sheet, and a strip of material applied to each longitudinal marginal portion of said top sheet so as to form a raised bead therealong, each said strip being overlaid by a layer of moisture impervious material arranged to cover the corresponding edge of the top sheet and prevent escape of liquid from the diaper via said strip or via said corresponding edge of said top sheet.

Preferably said backing sheet has a longitudinally extending central zone and longitudinally extending marginal portions, said diaper being folded into a box-pleated configuration by inward folding about a first pair of fold lines extending longitudinally of said backing sheet within said central zone and by outward folding about a second pair of fold lines at the

junctions between said central zone and said marginal portions, and said strips extending longitudinally of said diaper on the top of each of the outwardly folded parts of said diaper corresponding to said marginal portions.

In a particularly preferred form said mass of absorbent material is disposed on said central zone of said backing sheet so as to lie wholly within said second pair of fold lines.

The strips may comprise strips of a resilient foamed material, such as a polyurethane or natural or synthetic rubber foam. Alternatively the strips may each comprise a length of cellulose sheet twisted upon itself. In any event the strips are covered by a moisture impervious layer in order to prevent or minimize the escape of liquid from the diaper after application to an infant due to wicking via the strips or the edges of the top sheet. Thus in one form of diaper according to the invention the backing sheet is wider than the top sheet and longitudinal edge portions of the backing sheet are folded over the top sheet along each edge thereof so as to overlie the strips and form the superjacent moisture impervious layer. Alternatively a separate strip of moisture impervious sheet material may be applied along each marginal portion of the top sheet so as to overlie the strips. In the case where the top sheet and backing sheet are of substantially the same width each such separate strip is folded over the edge of the diaper and secured by heat sealing or by means of a suitable adhesive to the backing sheet.

The mass of absorbent material preferably comprises cellulosic fibres, which may have been treated with a biocidally effective amount of a quarternary ammonium salt such as a benzalkonium chloride. A sheet of absorbent material may be interposed between said mass and said backing sheet and/or between said mass and said top sheet. The mass may be sandwiched between a pair of sheets of absorbent material.

In order that the invention may be clearly understood and readily carried into effect some preferred embodiments thereof will now be described by way of example only with reference to the accompanying drawings, in which:—

Figure 1 and 2 shows top and bottom views respectively of a disposable diaper according to the invention in unfolded state;

Figure 3 is a view of the diaper of Figure 1 when folded into a box-pleated configuration;

Figures 4 and 5 are semi-diagrammatic cross-sectional views on the lines IV—IV and V—V respectively of Figure 3;

Figure 6 is a perspective view showing the diaper as though applied to an infant; and

Figure 7 is a cross-section similar to that of Figure 4 through a modified form of diaper.

Referring to the drawings a diaper 1 comprises a water impervious backing sheet 2 on which is a pad 3 of cellulosic fibres impregnated with a quaternary ammonium salt. Pad 3 is sandwiched between absorbent sheets 4 and 5, as can be seen from Figure 1, is slightly shorter than backing sheet 2 and slightly less than two thirds of its width. Overlying pad 3 and backing sheet 2 is a top sheet 6. Strips 10 of resilient foamed material are adhered to longitudinal marginal portions of the top sheet 6. Backing sheet 2 is somewhat wider than top sheet 6 and its edges are turned over the edges of top sheet 6 and over strips 10 to form turned over portions 7, the strips 10 producing beads or ridges 17 along each longitudinal edge of diaper 1.

Backing sheet 2 is made of a moisture-impervious material such as polyethylene, polyethylene terephthalate or plasticised polyvinyl chloride and may be impregnated with a natural or synthetic perfume such as rose, lavender, bouquet or jasmine. It may be pigmented with a white, pink, blue, yellow or other coloured pigment. Turned over portions 7 of backing sheet 2 prevent escape of liquid from the interior of the diaper by wicking through the strips 10 or top sheet 6 when the diaper is properly applied to an infant.

Pad 3 may be made by the process described in my co-pending patent application No. 28152/75 (Serial No. 1,513,056). The quaternary ammonium salt may be, for example a benzalkonium chloride such as benzyl trimethyl ammonium chloride.

Preferably the cellulose fibres of pad 3 are impregnated with a mixture of quaternary ammonium salts sold under the trade name "Bardoc 20" as a solution in isopropyl alcohol.

The sheets 4 and 5 are preferably cellulose sheets and may be of different weights per unit area.

Top sheet 6 is preferably hydrophobic in nature but must be porous to allow passage of urine. Preferably it is a non-woven cellulose sheet impregnated with a hydrophobic resin, e.g. a pine resin based ethylene oxide condensate such as that sold by Hercules Powder Company or a silicone resin. The preferred non-woven cellulose sheet is made from long haired wood cellulose fibres.

Top sheet 6 is secured along its edges and

at the ends 8 and 9 of the diaper 1 to backing sheet 2 by means of an adhesive or by heat sealing. Suitable adhesives include conventional polyvinyl chloride adhesives e.g. emulsion adhesives based on polyvinyl chloride, vinyl chloride/vinyl acetate copolymers or vinyl chloride/ vinylidene chloride copolymers. Such adhesives are conventionally plasticised with a plasticiser such as di-*n*-butyl phthalate and may contain between about 40% and about 60% by weight of solids. A suitable emulsion is one of those sold under the trade name "Corvic" by Imperial Chemical Industries Limited (the word "Corvic" is a registered Trade Mark). These adhesives can be applied by transfer roller and have the desired property of fast tack. They are also organic solvent-free which is advantageous from the point of view of safety during manufacture.

Suitable resilient foamed materials for forming strips 10 include flexible polyurethane and sponge rubber materials, for example a polyester/polyether type of flexible polyurethane in strip form such as that used for draught excluder strips. Natural or synthetic rubber foam strips may be used. These strips 10 are adhered to top sheet 6 by means of one of the above-mentioned emulsion adhesives or using a natural rubber latex adhesive. Although the illustrated strips are approximately square in section other cross sections of strip, e.g. rectangular or semi-circular can be used. Typical dimensions for the strip are, for example in the case of a rectangular section foam strip, from about $\frac{1}{4}$" to about $\frac{3}{8}$" wide and from about $\frac{1}{8}$" to about $\frac{1}{4}$" high.

During manufacture of the diaper 1 two spots of adhesive 11 are applied to a central portion of top sheet 6. Suitable adhesives include the emulsion adhesives mentioned above as well as adhesives of the organosol type, for example a mixture of polyvinyl chloride, a silicone resin and a plasticiser.

After application of spots 11 the diaper is folded inwardly about a first pair of longitudinal fold lines 12 and outwardly about a second pair of longitudinal fold lines 13 so as to form a box-pleated configuration. The spots of adhesive 11 which are disposed approximately midway between the ends 8 and 9 of the diaper serve to maintain the box-pleated configuration of the diaper. Fold lines 13 divide backing sheet 2 into a central longitudinal zone and two longitudinally extending marginal portions, while fold lines 12 lie within the central longitudinally extending zone.

The backing sheet 2 has applied thereto near the end 8 a pair of fastening tabs 14 (see Figure 2). These are shown in more detail in Figure 5. Each tab 14 consists of a length of pressure sensitive tape 15, the adhesive side of which is protected at one end by a length 16 of release paper. The tape 15 is folded so that its "sticky" side is outwards and applied to the backing sheet 2 near one edge thereof. Tape 15 is long enough to project past the edge of the diaper when the release paper 16 is removed and the tape 15 allowed to unfold.

Diaper 1 may be folded for packing purposes about a transverse line approximately intermediate the ends 8 and 9 so that the backing sheet 2 is on the outside.

In use the diaper 1 is placed backing sheet 2 side down on a suitable flat surface and the box pleat splayed out ready to receive the infant. The buttocks of the infant are placed on the diaper approximately midway between its ends and the free end drawn up between its legs. The lengths 16 or release paper are torn off and the tape 15 is pressed into contact with the backing sheet adjacent a corner at the other end of the diaper. It is convenient to place the diaper so that the end 8 is at the back of the infant. This facilitates fastening of the tabs 14. The initial box pleated configuration forces the diaper 1 to take up a shape somewhat as shown in Figure 6.

The ridges formed by sealing strips 10 bear against the infant's legs and serve to inhibit leakage of urine and semi-liquid excreta in the crotch region from the interior of the diaper. It is not necessary that the ridges bear with any great pressure against the infant's legs; indeed any great pressure would tend to result in indesirable reduced blood circulation. The purpose of the ridges 17 is not to produce a tight seal but merely a seal that is sufficient to prevent escape of liquid when the infant first discharges urine. This extends the residence time of the urine with the diaper and allows the cellulosic material of pad 3 to absorb all liquids and semi-solids substantially completely.

In other diapers of similar construction but lacking sealing strips 10 this extension of the liquid retention time is not present and when urine is produced in quantites it leaks from the diaper within a few seconds because of the lack of a seal in the crotch region and not because the cellulosic pads do not have the required absorptive capacity.

In place of the foam strips 10 there may be used twisted lengths of cellulose sheet.

If desired, prior to the application of each strip 10 the diaper can be draped or folded in the region where each foam strip 10 is to be appled so as to form a channel to receive the strip 10.

In this case the adhesive may extend somewhat up the side faces of the foam

strips which are then placed in the channels. The portions 7 are thereafter turned over onto the strip 10 so as to cover the strips or form beads or ridges 17 in the same way as described in relation to Figures 1 to 6.

In Figure 7 there is shown a modified form of diaper 21. This consists of a backing sheet 22, a pad of cellulose fibres 23 sandwiched between two layers of cellulose sheet 24 and 25. Overlying the cellulose sheet 24 is a hydrophobic porous top sheet 26. In this case backing sheet 22 and top sheet 26 are the same width. As with diaper 1 the box pleated configuration is held in place by adhesive spots 27. Foam strips 28 are adhered along the exposed faces of top sheet 26 and a further strip 29 of moisture impervious material (e.g. polyethylene, polyethylene terephthalate or plasticised polyvinyl chloride sheet) overlies and is adhered to strip 28 along each edge of the diaper so as to from a sealing ridge 30. The edge 31 is folded over the edge of the diaper and is adhered to the backing sheet 22. The diaper is otherwise similar to diaper 1.

According to the manufacturers' literature "Bardoc 20" has the formulation:—

	% by weight
Octyl decyl dimethyl ammonium chloride	25
Dioctyl dimethyl ammonium chloride	12.5
Didecyl dimethyl ammonium chloride	12.5
Isopropanol	30
Water	20

The backing sheet 2 or 22 can be, for example, a polyethylene sheet, which may be smooth or embossed (so as to improve its drape and feel), having a thickness of approximately 0.001 inch. An alternative material is polyethylene terephthalate sheet of thickness about 0.0005 inches.

Pad 3 or 23 may be a batt formed of loosely compacted short cellulose fibres, such as wood pulp fibres, or cotton linters, or mixtures thereof, which are primarily held together by inter-fibre bonds requiring no added adhesive, as is known in the art. Briefly, this batt is a low bulk density coherent web of loosely compacted cellulose fibres, preferably, comminuted wood pulp fibres, in the form of so-called "fluff".

The term "short fibres", as used herein, refers to fibres less than $\frac{1}{4}$ inch in length, in contrast to "long fibres", or "textile length fibres", which are longer than $\frac{1}{4}$ inch in length, and generally are between $\frac{1}{4}$ and $2\frac{1}{4}$ inches in length. The former are substantially less costly than the latter. The classification of fibres by length may be carried out by the Clark Classification procedure described in the test manual of the Technical Association of Pulp and Paper Industry (TAPPI-T233 SU64).

Preferably the pad 3 or 23 comrises a batt formed from loosely compacted comminuted cellulose fibres, substantially all of which have a length of less than 1 mm, and preferably less than about 0.6 mm.

If desired the side of the batt adjacent to the backing sheet 2 or 22 may be densified by a slight moistening of that surface of the batt followed by the application of pressure thereto.

The top sheet 6 or 26 may be made up of a mixture of fibres consisting predominantly of inexpensive short cellulose fibres such as wood pulp fibres or cotton linters, in amounts of about 75% to about 98%, the balance being textile length fibres such as rayon. In such material, the short fibres are in uniform admixture with 2% to 25% by weight of textile length fibres, such as 1.5 denier rayon fibres uniformly cut to $1\frac{1}{2}$ inch length. The short and long fibres are randomly and substantially uniformly dispersed and bonded with a bonding agent such as a self-crossed-linking emulsion. The material of the top sheet 6 or 26 may also be treated with a wetting agent to partially counteract the water repellency of the boding agent and bring the sheet to the desired degree of wettability.

Sheet materials for use as top sheet 6 or 26 preferably have fabric weights in the range of 1 to 5 oz per square yard and densities less than 0.15 grams per cc, generally in the range between 0.05 and 0.10 grams per cc. The dry strength, for a fabric for use as top sheet 6 or 26 and having a weight of about 1.5 oz per square yard, is preferably at least 0.15 pounds per inch of width in the machine direction and at least 0.10 pounds per inch of width in the cross direction. Such fabrics have good elongation, loft, softness and drape characteristics.

The top sheet 6 or 26 may also be an apertured non-woven fabric formed, for example as a foraminous structure wherein groups or groupings of fibres have been rearranged from a fibrous non-woven starting web into positions surrounding less dense fabric portions by passage of a fluid through the starting material. The fibres within the groupings are mechanically interlocked and may be arranged into various patterns, as is well understood by those skilled in the art. A suitable binder may be utilized to help retain the fibres in their rearranged locations, as is also well understood by those skilled in the art. The fabric can be made of naturally occuring

fibres, synthetic fibres or blends thereof. Typical material for top sheet 6 or 26 made of a polyester material may have a weight of $\frac{1}{4}$ oz. per square yard.

It should also be understood that the top sheet 6 or 26 may be formed of nonapertured (but porous) material such as a non-woven isotropic web, sponge, or the like. In all of the aforementioned top sheet materials, the materials should preferably be relatively hydrophobic so as to retard wicking within the top sheet 6 or 26.

WHAT I CLAIM IS:—

1. A disposable diaper comprising a moisture impervious backing sheet of length greater than its width, a mass of absorbent material on said backing sheet, a porous top sheet of length greater than its width overlying said mass, edge portions of said top sheet being secured to said backing sheet, and a strip of material applied to each longitudinal marginal portion of said top sheet so as to form a raised bead therealong, each said strip being overlaid by a layer of moisture impervious material arranged to cover the corresponding edge of the top sheet and prevent escape of liquid from the diaper via said strip or via said corresponding edge of said top sheet.

2. A disposable diaper according to claim 1, in which said backing sheet has a longitudinally extending central zone and longitudinally extending marginal portions, said diaper being folded into a box-pleated configuration by inward folding about a first pair of fold lines extending longitudinally of said backing sheet within said central zone and outward folding about a second pair of fold lines at the junctions between said central zone and said marginal portions, and suid strips extending longitudinally of said diaper on the top of each of the outwardly folded parts of said diaper corresponding to said marginal portions.

3. A disposable diaper according to claim 2 in which areas of adhesive are applied to the top sheet within said second pair of fold lines to maintain said box-pleated configuration by mutual adherence of portions of said top sheet one to another.

4. A disposable diaper according to claim 3, in which said areas of adhesive are located approximately midway between the shorter edges of the top sheet.

5. A disposable diaper according to any one of claims 2 to 4, in which said mass of absorbent material is disposed on said central zone of said backing sheet so as to lie wholly within said second pair of fold lines.

6. A disposable diaper according to any one of claims 1 to 5, in which said backing sheet comprises a sheet of polyethylene or plasticised polyvinyl chloride.

7. A disposable diaper according to any one of claims 1 to 6, in which said mass of absorbent material comprises a pad of absorbent fibers.

8. A disposable diaper according to claim 7, in which said absorbent fibres comprise cullulose fibres.

9. A disposable diaper according to claim 8, in which said cellulose fibres have been treated with a biocidally effective amount of a quaternary ammonium compound.

10. A disposable diaper according to any one of claims 1 to 9, in which a sheet of absorbent material is interposed between said mass and said backing sheet.

11. A disposable diaper according to any one of claims 1 to 10, in which a sheet of absorbent material is interposed between said mass and said top sheet.

12. A disposable diaper according to claims 10 and 11, in which said mass of absorbent material is sandwiched between a pair of sheets of absorbent material.

13. A disposable diaper according to any one of claims 1 to 12, in which said top sheet comprises a sheet of porous hydrophobic material.

14. A disposable diaper according to claim 3, in which said top sheet comprises a non-woven cellulosic sheet which has been impregnated with a hydrophobic resin.

15. A disposable diaper according to any one of claims 1 to 14, in which said strips comprises strips of a resilient foamed material.

16. A disposable diaper according to claim 15, in which said resilient foamed material comprises a polyurethane or natural or synthetic rubber foam.

17. A disposable diaper according to any one of claims 1 to 14, in which said strips comprise lengths of twisted cellulose sheet.

18. A disposable diaper according to any one of claims 1 to 17, in which said strips are adhered to the top sheet.

19. A disposable diaper according to any one of claims 1 to 18, in which said backing sheet is wider than said top sheet and is folded over said top sheet along each longitudinal edge thereof and over the corresponding strip to form the corresponding over-lying layer of moisture impervious material.

20. A disposable diaper according to any one of claims 1 to 18, in which each said strip is overlaid by a separate strip of moisture impervious material which extends around the adjacent edge of said top sheet and is secured to said backing sheet.

21. A disposable diaper according to any one of claims 1 to 20, in which said edge portions of said top sheet are secured to

said backing sheet by means of an emulsion adhesive.

22. A disposable diaper according to any one of claims 1 to 20, in which said edge portions of said top sheet are secured to said backing sheet by means of heat sealing.

23. A disposable diaper according to any one of claims 1 to 22, in which fastening tabs are provided adjacent each edge of said diaper on said backing sheet adjacent one end thereof.

24. A disposable diaper constructed and arranged substantially as herein described with particular reference to the accompanying drawings.

BATCHELLOR, KIRK & EYLES,
Chartered Patent Agents,
100 Great Russell Street,
London, WC1B 3LA,
For the Applicant.

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1 513 055 COMPLETE SPECIFICATION
2 SHEETS
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SHEET 1

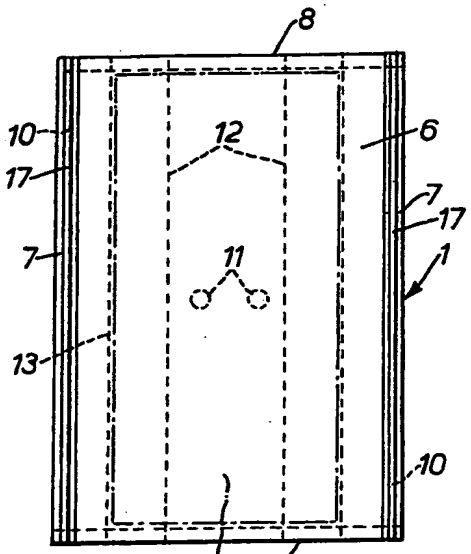

FIG. 1.

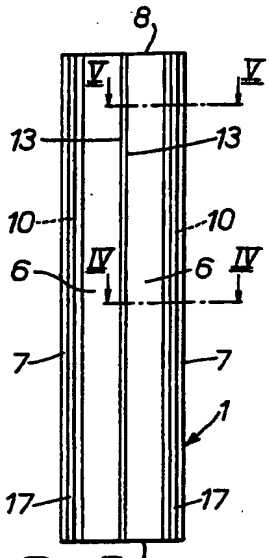

FIG. 3.

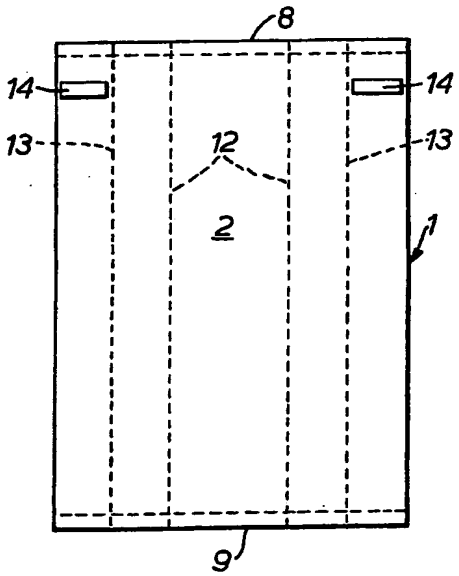

FIG. 2.

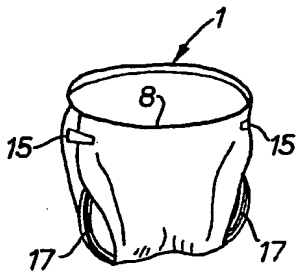

FIG. 6.

1 513 055 COMPLETE SPECIFICATION
2 SHEETS
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SHEET 2

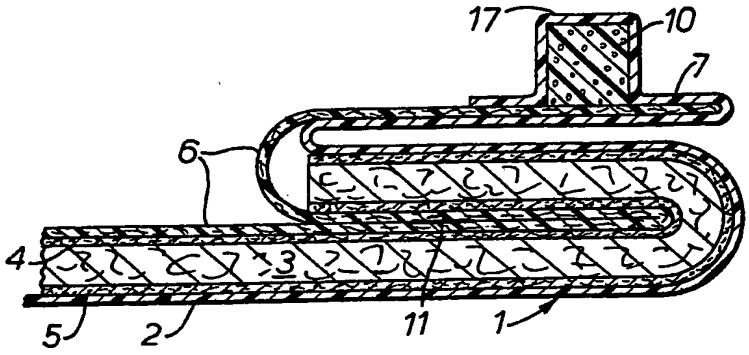

FIG. 4.

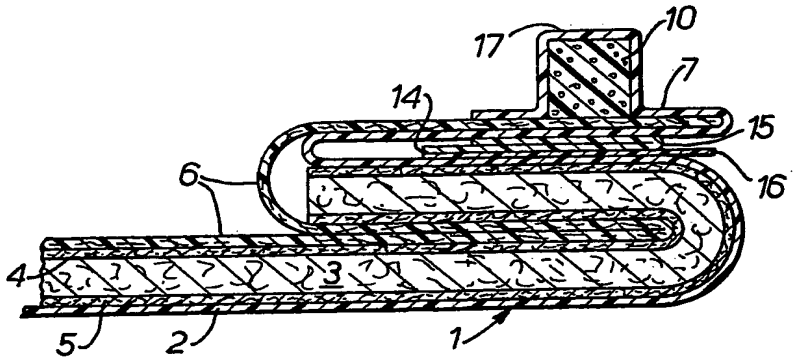

FIG. 5.

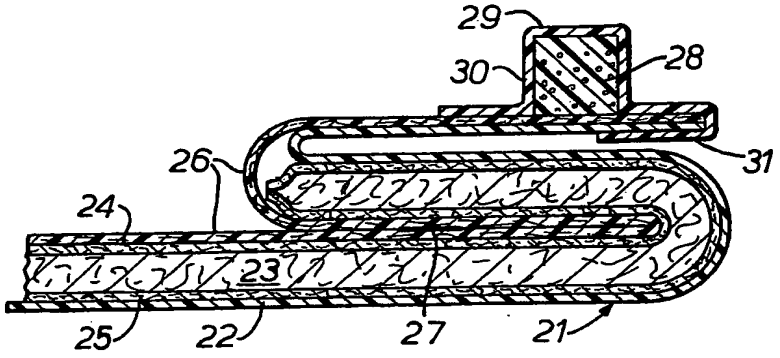

FIG. 7.

(12) UK Patent Application (19) GB (11) 2 101 468 A

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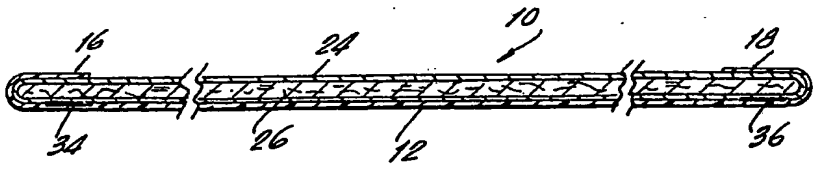
(58) Field of search A3V
(71) Applicants Colgate-Palmolive Company (USA—Delaware), 300 Park Avenue, New York, New York 10022, United States of America
(72) Inventor Hamzeh Karami
(74) Agents Kilburn and Strode, 30, John Street, London, WC1N 2DD

(54) **Diaper with cushioned elastic members**

(57) A disposable diaper, which is preferably box-pleated, has cushioned elastic members (34 and 36) secured between the impervious backing sheet 12 and the absorbent pad (26) and is adapted to overcome leakage through the leg hole edges while cushioning so as to reduce the incidence of indentations or marks on an infant's skin.

FIG. 2



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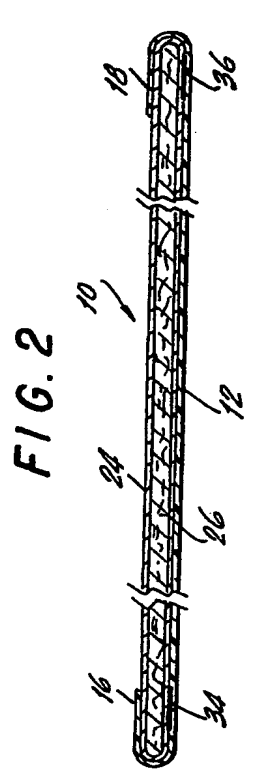

FIG. 2

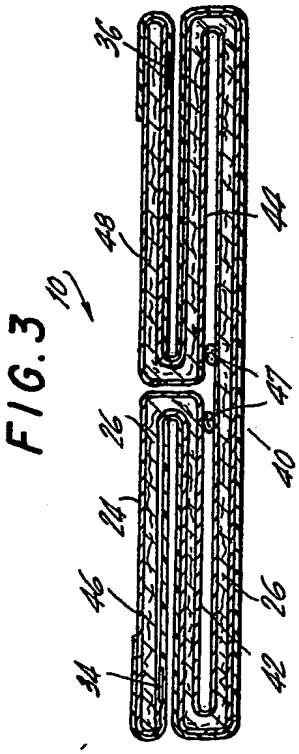

FIG. 3

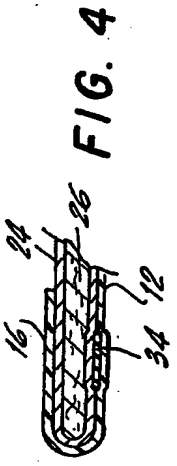

FIG. 4

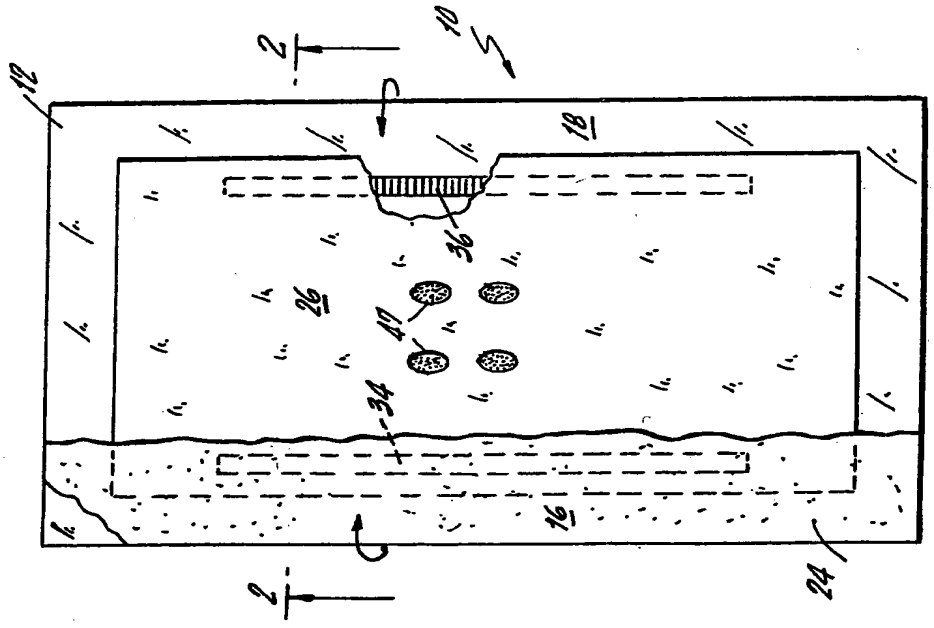

FIG. 1

SPECIFICATION

Diaper with cushioned elastic members

This invention relates to disposable diapers and more particularly to an elasticized preferably box pleated diaper.

In the past elasticized diapers have been developed for use only with contoured shaped configurations such as an hous-glass shape, such as that disclosed in the United States Patent to Buell, No. 3,860,003, issued Januray 14, 1975 for "Contractable Side Portions for Disposable Diaper" wherein elastic strips are secured to the crotch portions of the diaper and spaced at least $\frac{3}{4}$ inch (19 mms) from the absorbent pad to form elasticized crotch seals for securement over the legs of the infant to prevent loss of fluid from the interior of the diaper along the legs of the infant. The elasticized strips were placed more than $\frac{3}{4}$ inch (19 mms) from the absorbent pad in order to prevent pleats forming transversely of the crotch area of the diaper.

Another contoured diaper is presently in production in which the elasticized strips are less than $\frac{3}{4}$ inch (19 mms) from the absorbent pad for the production of the transverse pleats in the crotch area of the diaper for the purpose of increasing the absorbent capacity at the crotch area of the diaper. This diaper is disclosed in United States Patent No. 4,050,462. However, it has been found that these pleats may act as a channel resulting in excessive diaper leakage and the pleats in the crotch area make the infant's bottom uncomfortable when sitting, especially while the diaper is not saturated.

The elasticized construction in both the previous contoured diapers as disclosed in the aforesaid patents cause marks and indents to be formed in the skin of the infant on which these types of diapers are used.

The present invention overcomes the disadvantages of both of the prior art contoured diapers. The elastic members are placed according to the present invention in a box-pleated diaper between the absorbent pad and the backing sheet cushioning the elastic action and preventing marks and indents being formed in the skin of the infant while providing unexpectedly better protection against excessive leakage through leg hole edges.

The concept of the present invention features a box-pleated disposable diaper having an absorbent body between a top sheet and a backing sheet with elastic members secured between the backing sheet and the absorbent pad.

The invention may be put into practice in various ways and one specific embodiment will be described to illustrate the invention with reference to the accompanying drawings in which:

Figure 1 is a plan view of a box-pleated diaper constructed in accordance with the concepts of the present invention;

Figure 2 is a transverse sectional view taken along the plane of line 2—2 in Figure 1 of the diaper in an unfolded state;

Figure 3 is a section detail view similar to Figure 2 but taken on the line 3—3 and showing the diaper in a box-pleated folded configuration and

Figure 4 is an enlarged sectional detail view showing in particular the locus of an elastic member.

In the accompanying drawings, wherein like reference numerals designate similar parts throughout the various views reference numeral 10 generally designates an elasticized disposable diaper contructed in accordance with the present invention.

The box-pleated diaper 10 has a backing sheet 12 of a fluid impervious material. A fluid pervious sheet 24, typically of non-woven fibres such as polyethylene or polypropylene fibres, is provided and the backing sheet 12 has portions 16 and 18 folded over and sealed to edges of the top sheet. An absorbent pad 26 of wood fluff or the like is disposed between the top sheet 24 and the backing sheet 12. It will be observed from Figures 2, 3 and 4 that the pad 26 is in fact enclosed in the sheet 24 which is wrapped round its top and bottom faces and side edges. However, arrangements in which the sheet 24 only covers the top surface or top surface and side edges of the pad 26 are also possible. A pair of elasticized strips 34 and 36 are disposed between the backing sheet 12 and the pad 26 and underly portions 16 and 18 of the diaper. The diaper is folded in a box-pleated configuration having a central portion 40, two inwardly extending panels 42 and 44, and two outwardly extending panels 46 and 48. Adhesive spots 47 may be used to hold the pleats in place.

Each elastic member 34 and 36 may be secured by spots or lines of adhesive along preferably part of its length in the crotch area of the diaper 10 or alternatively along its entire length. A further alternative is to use the same means which are used to seal the top sheet to the backing sheet to seal the ends of the elasticized strips 34 and 36 to the backing sheet 22. These means may be adhesive or hot melt adhesive lines.

The elastic strips 34 and 36 may be of any suitable construction and composition and materials such as conventional rubberized (or otherwise elastomerized) fibres or may be simply a strip of elastomeric resin or foamed resin which may or may not be provided with adhesive. Such strips are generally available as double-sided transfer tapes (e.g. 3M Co., St. Paul, Minnesota, tape No. 465 high tack pressure-sensitive tape). In addition one may apply the elastic material, e.g. a rubber band, and secure the same with a suitable adhesive (e.g. of hot melt or pressure sensitive type). The adhesive may be a continuous line or may be a series of adhesive spots which may be applied on one or both sides of the elastic material. In use, the diaper is positioned on the infant in a conventional manner with the conventional waist tape fastener placing tension on the elastic members 34 and 36 thus forming

crotch seals. However, the pad 26 is between the elastic members 16 and 18 and the infant and serves to reduce the incidence of lines or marks on the infant's skin thus increasing the infant's comfort while also increasing fluid tightness.

CLAIMS

1. A disposable diaper comprising a backing sheet secured to a top sheet with an absorbent pad located therebetween, a pair of spaced elasticized members disposed between the said backing sheet and the said pad, so that the said pad cushions the effect of the elastic members in use.

2. A disposable diaper as claimed in Claim 1, including means securing the central portions of the said elastic members to the said backing sheet.

3. A disposable diaper as claimed in Claim 1 or Claim 2 in which the said backing sheet has marginal edges folded over the said top sheet and bonded thereto, the said elastic members lying below the said marginal edges.

4. A disposable diaper as claimed in any one of Claims 1 to 3 in which the said top sheet is bonded to the said backing sheet by hot melt, or heat sealing techniques.

5. A disposable diaper as claimed in any one of Claims 1 to 4 in which the top sheet also extends around the sides and back of the absorbent pad.

6. A disposable diaper as claimed in any one of Claims 1 to 5 in which the said diaper is of a generally rectangular shape.

7. A disposable diaper as claimed in any one of claims 1 to 6 which is folded into a box-pleated configuration.

8. A disposable diaper as claimed in Claim 7 in which the said box-pleat configuration includes a main body portion, an inwardly extending pair of panels, and an outwardly extending pair of panels, the said elastic members being disposed in outer portions of the said outwardly extending panels.

9. A disposable diaper as claimed in Claim 1 substantially as specifically described herein with reference to the accompanying drawings.

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